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April 12, 2017

Ex Parte

Marlene H. Dortch, Secretary
Federal Communications Commission
445 12th Street S.W.
Washington, D.C. 20554

Re: Revision of Part 15 of the Commission's Rules to Permit Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band, ET Docket No. 13-49

Dear Ms. Dortch:

On April 12, 2017, I spoke by telephone with Rachael Bender, acting wireless advisor to Chairman Pai, regarding the above-referenced proceeding. During our call, I provided a brief overview of the comments that NCTA – The Internet & Television Association filed today with the National Highway Traffic Safety Administration regarding that agency's vehicle-to-vehicle rulemaking proceeding. A copy of those comments is attached to this letter.

Respectfully submitted,

/s/ Danielle J. Piñeres

Danielle J. Piñeres

Attachment

cc: Rachael Bender

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April 12, 2017

BY ELECTRONIC FILING

Jack Danielson
Executive Director
National Highway Traffic Safety Administration
1200 New Jersey Ave., S.E.
Washington, D.C. 20590

Re: Federal Motor Vehicle Safety Standards: V2V Communications, Docket No. NHTSA-2016-0126

Dear Mr. Danielson:

NCTA – The Internet & Television Association (NCTA) appreciates the opportunity to comment on the National Highway Traffic Safety Administration's (NHTSA) Notice of Proposed Rulemaking (NPRM) on vehicle-to-vehicle (V2V) communications systems that will use spectrum in the 5850-5925 MHz (5.9 GHz) band. The 5.9 GHz band is critical to next-generation wireless broadband. Unfortunately, the NPRM engages in faulty analysis to arrive at a misguided proposal that would threaten a critical part of the country's wireless future. NCTA therefore urges NHTSA to (1) amend its cost-benefit analysis to properly account for the costs its mandate would impose on broadband consumers and investors; and (2) consider how it can advance vehicle safety while supporting the Federal Communications Commission's (FCC) efforts to permit efficient, shared use of the 5.9 GHz band.

NCTA is a national trade association representing the interests of cable television operators, programmers, and equipment manufacturers. NCTA's members have invested hundreds of millions of dollars to deploy some of the largest wireless broadband networks in the United States. These Wi-Fi networks support 2.5 billion active sessions every month, carrying over 169 petabytes of data. Given the rapidly escalating data burden that Wi-Fi networks are expected to carry, it is no surprise that forecasts indicate that the United States will require up to 1.6 GHz of new Wi-Fi spectrum by 2025 to support growing consumer demand.[1] This will prove challenging without wise stewardship of America's

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[1] Quotient Associates, *Wi-Fi Spectrum Needs Study, Final Report*, at 26 (Feb. 2017), https://www.wi-fi.org/downloads-registered-guest/Wi-

spectrum resources.

The 5.9 GHz band is widely recognized as the single best hope to address the current Wi-Fi spectrum deficit. Because the band is adjacent to the intensively used core Wi-Fi band at 5725 to 5850 MHz—known as U-NII-3—companies can bring it into use quickly using existing technologies. This proximity also means that opening the 5.9 GHz band for shared unlicensed use would make available the first contiguous 160 MHz "Gigabit Wi-Fi" channel for widespread consumer use. That large channel would enable American broadband consumers to access the full benefits of the latest generation of Wi-Fi: gigabit speeds, lower latency, and longer battery life.

For these reasons, the FCC has rightly identified the 5.9 GHz band for sharing and has undertaken a multi-year rulemaking and testing process to discern the best sharing technology. Because dedicated short range communications (DSRC) technologies are still in the pilot phase and have not yet been widely deployed commercially, now is the time for the FCC to identify an optimized sharing approach that will allow both V2V safety messages and Wi-Fi to flourish in the band. Without careful consideration, NHTSA's regulatory mandate could undo this important endeavor and waste years of FCC and industry effort to bring high speed broadband over Wi-Fi to consumers. Unfortunately, the NPRM has not undertaken this consideration and does not reflect the costs of the proposed new regulation on national spectrum policy or on investment in and deployment of mobile broadband.

We therefore recommend that NHTSA act in this proceeding, consistent with governing law, to:

- Recognize the differing jurisdictions of NHTSA and the FCC. NHTSA lacks jurisdiction over spectrum policy and interference issues, which have been delegated by Congress to the FCC;
- Accurately account in its cost-benefit analysis for the significant opportunity cost of restricting wireless broadband associated with the proposed mandate;
- Decline to impose a mandate that companies adopt a specific technology, chosen by the agency, to achieve safety goals in light of the excessive costs of doing so; and
- Consider meaningful regulatory alternatives to such a mandate.

NCTA is committed to working with all stakeholders and agencies to correct these deficiencies in the current NPRM and devise an alternative approach to advance both vehicle safety and wireless broadband applications in the 5.9 GHz band.

I. NHTSA Lacks Jurisdiction over Spectrum Policy and Interference Management

As NHTSA recognizes in the NPRM, the National Traffic and Motor Vehicle

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Fi%2BSpectrum%2BNeeds%2BStudy_0.pdf/33364.

Safety Act (Safety Act) limits its jurisdiction to safety standards.[2] The Safety Act grants NHTSA authority over "motor vehicle safety standards for motor vehicles and motor vehicle equipment," meaning standards designed to "*protect[] the public against unreasonable risk of accidents* occurring because of the design, construction, or performance of a motor vehicle, and *against unreasonable risk of death or injury in an accident*."[3] Although the V2V communications that NHTSA proposes to mandate rely on spectrum, NHTSA explicitly recognizes that it lacks authority to make decisions on spectrum policy and interference management.[4] NCTA agrees; Congress specifically granted those duties and related authority to the FCC.[5]

Unfortunately, after recognizing NHTSA's limited jurisdiction, the NPRM improperly expands NHTSA's regulatory reach into areas that Congress assigned to the FCC. If NHTSA moves forward with the proposed mandate, it can establish safety standards *for V2V technology*, consistent with its jurisdictional limitations. But it must do so without deciding questions of spectrum policy that fall outside its jurisdiction—directly or indirectly. NHTSA must address these fundamental problems before moving forward with a V2V rule and must defer to the FCC's authority and expertise in spectrum management.

First, NHTSA should not mandate the use of a specific frequency for the exchange of basic safety messages (BSM). Although it may be within NHTSA's jurisdiction to require that BSMs be transmitted on a single common channel, NHTSA lacks jurisdiction to mandate which particular frequencies will define that channel, as it acknowledges.[6] Jurisdiction over radio station assignments, including band or channel plans, lies squarely with the FCC.[7] Consistent with that jurisdiction, the FCC has a proceeding open to consider which channel or range of channels should be used for BSM traffic.[8] In that

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2 Federal Motor Vehicle Safety Standards; V2V Communications, 82 Fed. Reg. 3854, 3957 (Jan. 12, 2017) (NPRM).

3 49 U.S.C. §§ 30101, 30102 (defining "motor vehicle safety") (emphasis added).

4 NPRM, 82 Fed. Reg. at 3984 ("The FCC, not NHTSA or DOT, has the authority to determine the commercial use of spectrum.").

5 47 U.S.C. § 303(c), (f) (noting that the FCC shall "[a]ssign bands of frequencies to the various classes of stations, and assign frequencies for each individual station" and shall "[m]ake such regulations not inconsistent with law as it may deem necessary to prevent interference between stations").

6 NPRM, 82 Fed. Reg. at 3885 ("DOT defers to the FCC's authority with respect to spectrum rights and channel plans.").

7 *Id.* ("The FCC has statutory authority for allocating spectrum rights and designating band plans for commercial spectrum allocations, including the 5.9 GHz band."); 47 U.S.C. § 303(c).

8 *See The Comm'n Seeks to Update and Refresh the Record in the "Unlicensed Nat'l Info. Infrastructure (U-NII) Devices in the 5 GHz Band" Proceeding*, Public Notice, 31

proceeding, the FCC is considering changing channel assignments for the BSM. It is therefore improper for NHTSA to propose to require all BSM transmissions to take place specifically on Channel 172, from 5855-5865 MHz,[9] because this would usurp FCC authority.

Second, NHTSA lacks the authority to consider potential mechanisms for Wi-Fi and DSRC to share the 5.9 GHz band. Although the Department of Transportation (DOT) has participated in the ongoing FCC proceeding[10] and has indicated its interest in possible ways to share the band, it is not within NHTSA's jurisdiction to "seek comment on the costs and benefits of each sharing proposal, and . . . consider each of the[] [sharing] approaches relative to this proposed rule" as part of this proceeding.[11] This issue, too, falls within the FCC's authority, not NHTSA's.

Moreover, selecting a sharing mechanism for the 5.9 GHz band requires expertise that NHTSA does not have. Dozens of interested parties—from within and outside the transportation industry—have participated in the ongoing FCC proceeding to generate options for the band's most efficient use and to assess the technical feasibility of those policy options. With the assistance of technical experts and economists specializing in spectrum, the FCC conducts this type of analysis routinely, as part of its Congressionally mandated duty to work with other agencies to identify spectrum for wireless broadband use. NHTSA, on the other hand, has had no reason to develop similar expertise and has no authority to consider the 5.9 GHz band in the larger context of optimizing the nation's spectrum resources.

Third, NHTSA must not adopt rules that indirectly accomplish extra-jurisdictional spectrum policy decisions that it cannot accomplish directly—thereby improperly determining the outcome of the FCC's 5.9 GHz proceeding. Yet adopting the proposed regulation would do just that. The NPRM goes so far as to admit that it has not seriously considered regulatory alternatives to its mandate—a problem discussed in more detail in Part III, below—for fear that alternatives resulting in slower DSRC deployment "would mean that the designated spectrum for V2V safety applications would be lost."[12] In other words, NHTSA proposes to race to impose new regulations without developing a full record on alternatives, all in the hopes of narrowing the regulatory options available to the FCC. This would undermine the jurisdictional decisions made by Congress, poorly serve American consumers, and fall short of the reasoned decision-making required by the

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FCC Rcd 6130, 6135-36 (2016) (Public Notice).

9 NPRM, 82 Fed. Reg. at 3885 ("[W]e are proposing . . . that all vehicles should transmit the basic safety message on Channel 172 . . . .").

10 *See, e.g.*, Letter from Nathanial Beuse, Associate Administrator for Vehicle Safety Research, to Marlene H. Dortch, Secretary, FCC, ET Docket No. 13-49 (Mar. 10, 2014).

11 NPRM, 82 Fed. Reg. at 3886.

12 *Id.* at 3964.

Administrative Procedure Act.

Finally, although the NPRM acknowledges that the FCC has not yet reached its decision regarding spectrum sharing in the 5.9 GHz band, it improperly proceeds as if the debate were settled. For example, the NPRM states that "DOT believes that any estimate of the opportunity cost of this NPRM should be made in the context of the FCC's *existing* policies and authorities," in other words, "consistent with the FCC's designation of spectrum."[13] As NHTSA is well aware, the spectrum allocated for DSRC nearly two decades ago laid fallow for many years, leading the FCC to open a proceeding that is likely—at a minimum—to change the service rules for the 5.9 GHz band.[14] Many open questions remain regarding the FCC's policies for the 5.9 GHz band and, as NHTSA agrees, it lacks the jurisdiction to decide them. Accordingly, NHTSA's cost-benefit analysis must wait until the FCC settles these questions so NHTSA can account for the opportunity cost of precluding alternative uses of spectrum not only "consistent with the FCC's [current] designation," but consistent with other alternatives under consideration at the FCC. As discussed below in Part II, because NHTSA moved forward before an FCC decision, it seriously miscalculates the costs that the proposed mandate would impose on consumers and investors.

II. NHTSA's Cost-Benefit Analysis Significantly Understates the Costs to Consumers and Investors of the Proposed V2V Mandate

NHTSA's proposed V2V mandate would impose substantial opportunity costs on investors in Wi-Fi technologies and on the millions of Americans who use them by precluding other economically valuable uses of, and investments in, the 5.9 GHz band.[15] As discussed above, those opportunity costs, though significant in every case, will change depending on the FCC's decision. Faced with that ambiguity, NHTSA has chosen the worst of both worlds: the NPRM forges ahead with deeply flawed "generic calculations" of spectrum opportunity costs,[16] while at the same time purporting to delay its real estimate for release "as part of its RIA in a final rule," when interested parties will not have a meaningful opportunity to critique that analysis.[17] NHTSA must develop a complete and correct evaluation of spectrum opportunity costs, but cannot do so without knowing how the FCC intends to proceed in authorizing sharing of the 5.9 GHz band. NHTSA should therefore wait until the FCC decides the question of spectrum sharing before enacting a V2V rule.

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13 *Id.* at 3984 (emphasis added).

14 *See generally* Public Notice, 31 FCC Rcd. 6130.

15 Letter from Rick Chessen, NCTA, to David J. Friedman, Deputy Administrator, NHTSA, Docket No. NHTSA-2014-0022, at 15 (filed Oct. 20, 2014).

16 *See* NPRM, 82 Fed. Reg. at 3985-86.

17 *See id.* at 3986.

A. NHTSA Cannot Conduct an Accurate Analysis of the Opportunity Cost of Spectrum Until the FCC Adopts a Coexistence Mechanism for the 5.9 GHz Band

Given the FCC's ongoing proceeding considering shared use of the 5.9 GHz band, NHTSA's cost-benefit analysis cannot be sufficiently accurate or reliable to meet NHTSA's regulatory responsibilities until the FCC has determined how to enable spectrum sharing while protecting the transmission of BSMs from harmful interference.[18] The opportunity cost of spectrum will be a significant factor in NHTSA's overall cost estimate for the V2V mandate, but that cost depends on the coexistence approach the FCC adopts to protect BSM transmissions. There are at least two coexistence options currently before the FCC, and the outcome of the FCC's rulemaking will significantly impact NHTSA's cost benefit analysis. For example, some have advocated before the FCC that the detect-and-vacate approach to coexistence would render the entire 5.9 GHz band unusable for Wi-Fi, as well as jeopardize the neighboring U-NII-3 band that millions of devices are already using for Wi-Fi today.[19] As compared to a coexistence approach that would permit meaningful shared Wi-Fi use of the lower 45 MHz of the 5.9 GHz band under reasonable technical rules, detect-and-vacate would cost between $10 and $20 billion per year in terms of lost utility in the 5.9 GHz band alone.[20] If, as proposed,[21] detect-and-vacate were also to

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[18] The parties to the FCC's proceeding—including DSRC advocates—largely agree that the FCC's rules should change in some way to facilitate sharing. Comments of the Toyota Motor Corporation, ET Docket No. 13-49, at 29 (filed July 7, 2016) ("Toyota respects and supports the Commission's efforts to explore constructive sharing solutions between DSRC systems and unlicensed U-NII devices."); Further Comments of Cisco Systems, Inc., ET Docket No. 13-49, at 1 (filed July 7, 2016) ("The . . . issue is no longer whether the band should be shared, but how."); Comments of Advocates for Highway and Auto Safety, ET Docket No. 13-49, at 1 (filed July 6, 2016); Comments of American Association of State Highway and Transportation Officials, ET Docket No. 13-49, at 7 (July 7, 2016).

[19] Letter from Christopher Szymanski, Broadcom Limited, Rick Chessen, NCTA, and John W. Kuzin, Qualcomm Incorporated, to Marlene H. Dortch, Secretary, FCC, ET Docket No. 13-49, at 2 (filed Feb. 3, 2017); Comments of Open Technology Institute at New America, Public Knowledge, Engine, Common Cause, and Next Century Cities, ET Docket No. 13-49, at 5 (filed July 7, 2016).

[20] *See* Coleman Bazelon & Lucrezio Figurelli, *The Economic Costs and Benefits of a Federal Mandate that All Light Vehicles Employ 5.9 GHz DSRC Technology*, at 32 (May 2, 2016) (estimating the annual opportunity cost of preserving the 5.9 GHz band exclusively for DSRC use at $10 to $20 billion per year) (Brattle Report).

[21] Letter from Mary Brown, Cisco, to Marlene H. Dortch, FCC, ET Docket No. 13-49, at Attachment, p. 5 (filed Dec. 23, 2015) (stating that its proposed detect-and-vacate approach would "benefit[] DSRC by extending protection down to 5825 MHz (an additional 25 MHz of protection compared to today)"); Further Comments of Cisco Systems, Inc., ET Docket No. 13-49, at 4 (filed July 7, 2016) ("Cisco's plan also proposes moving Channel 165 (5815-5835 MHz) Wi-Fi transmissions ongoing at the

impair the top portion of the existing U-NII-3 band—today's Wi-Fi workhorse—the costs of this coexistence approach would be higher still. Extending detect-and-vacate limitations to U-NII-3 could significantly impair the utility of *already-deployed* devices, stranding significant investment and decreasing the future utility of the band. Nonetheless, the NPRM fails to account for any of these costs.

The other proposed approach to coexistence—rechannelization—would impose fewer costs than detect-and-vacate. It would not, however, be cost-free as compared to a world in which Wi-Fi could operate under favorable technical rules throughout the 5.9 GHz band. Rechannelization provides the optimal protection for latency sensitive, safety-of-life DSRC operations—such as the BSM—by providing these services with exclusive use of the top 30 MHz of the band, while limiting Wi-Fi to sharing with non-safety DSRC in the lower 45 MHz. This approach would allow commercially viable Wi-Fi to operate in part of the band. But it would also preclude Wi-Fi use of the upper 30 MHz, creating significant, but different, opportunity costs as compared with detect-and-vacate. The NPRM fails to account for these costs. Furthermore, the NPRM fails to account for the fact that its proposal to require that all BSM transmissions take place on channel 172 would be inconsistent with the FCC adopting this lower-cost option.

If NHTSA forges ahead with the V2V mandate without waiting for an FCC decision on Wi-Fi coexistence, its final V2V cost-benefit analysis would almost certainly be inaccurate (even if it attempts to account for the opportunity cost of precluding other spectrum uses).

B. NHTSA's Opportunity Cost of Spectrum Estimate Dramatically Understates the Value of Unlicensed Spectrum

NHTSA's attempt to calculate a spectrum opportunity cost is deeply flawed and arbitrarily ignores several key principles of spectrum valuation. As a result, the NPRM dramatically understates the opportunity cost of foregone shared use of 5.9 GHz spectrum. Correcting just a few of the flaws in NHTSA's analysis yields a figure *more than seven times higher* than NHTSA suggests.

In calculating a per-MHz value of the 5.9 GHz band, NHTSA assumes that all spectrum is equally valuable, without accounting for the unique location of the 5.9 GHz band on the radiofrequency spectrum or the characteristics and technical limitations associated with other spectrum bands it references. Although it recognizes that "[s]pectrum value differs with respect to variables including, but not limited to, frequencies" and that "[f]requencies might be the most significant factor to determine the value," NHTSA does not apply this reasoning to its calculation of the value of the 5.9 GHz band.[22] This is wrong for multiple reasons.

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top edge of the U-NII-3 band. . . .").

[22] NPRM, 82 Fed. Reg. at 3986.

First, the NPRM improperly treats the 5.9 GHz band as a generic block of unlicensed spectrum. However, the 5.9 GHz band is uniquely valuable for Wi-Fi as a result of its proximity to U-NII-3, one of the most heavily used bands in the United States for mobile data. Because 5.9 GHz is immediately adjacent to U-NII-3, existing equipment could make use of this additional spectrum very quickly and bring online a new wide-band (160 MHz) 802.11ac Wi-Fi channel. A spectrum valuation for 5.9 GHz that looks to all existing unlicensed bands as a gauge to establish its value therefore significantly underestimates the value of this unique band.

The NPRM also incorrectly assumes that all unlicensed frequencies available for Wi-Fi today are equally valuable. In order to arrive at a per-MHz value for unlicensed spectrum, NHTSA takes a total value for unlicensed Wi-Fi spectrum of $110 billion and divides it by 638, the total number of megahertz it believes is available for unlicensed use.[23] In fact, much of that 638 MHz is not suitable for Wi-Fi use. NHTSA includes for example, 355 MHz of spectrum in the 5 GHz band that is burdened with dynamic frequency selection limitations that effectively preclude most Wi-Fi uses. As the Brattle Group properly recognized in the report it filed in response to NHTSA's ANPRM, an unlicensed spectrum valuation analysis should look only to the bands for which the technical rules permit widespread Wi-Fi operations—the key driver of economic growth from unlicensed services.[24]

Yet another error is NHTSA's reliance on a value of unlicensed spectrum set forth in a 2014 report by Telecom Advisory Services (TAS).[25] NHTSA should not have used these 2014 numbers when a report issued by the same author six months later provided a projected 2017 value of unlicensed spectrum.[26] Indeed, doing so is arbitrary. Using TAS's more recent numbers would provide NHTSA with a more accurate picture of the value of unlicensed spectrum today, especially given the growth in mobile data consumption between 2014 and 2017—much of which is handled through a Wi-Fi connection—and the emergence of new unlicensed use cases. There is good reason for confidence in TAS's projection. The author's growth calculations relied on then-current projections of 2017 adoption of various Wi-Fi devices and services that are regularly updated as part of a long-term research effort. Those projections have been validated by recently released figures on current adoption.[27] As discussed in more detail below, adjusting NHTSA's analysis to use

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23 *Id.* at 3986 n.358.

24 *See* Brattle Report at 28.

25 NPRM, 82 Fed. Reg. at 3986 & n.358.

26 *See generally* Raul Katz, Telecom Advisory Services, LLC, *Assessment of the Future Economic Value of Unlicensed Spectrum in the United States* (Aug. 2014), http://www.wififorward.org/wp-content/uploads/2014/01/Katz-Future-Value-Unlicensed-Spectrum-final-version-1.pdf (TAS Report).

27 *See* Cisco, Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2016-2021 (Feb. 9, 2017), http://www.cisco.com/c/en/us/solutions/collateral/service-provider/visual-networking-index-vni/mobile-white-paper-c11-520862.html.

the later, more accurate numbers has a significant impact on total opportunity cost of spectrum.

Similarly incorrect is NHTSA's net present value calculation, which assumes that "the value of the spectrum does not change from year to year."[28] In other words, NHTSA's analysis does "not reflect the progressive increase of the economic value of spectrum over time."[29] This introduces significant inaccuracies, as the value of a new spectrum band will increase over time as devices and traffic migrate to newly available frequencies, both relieving congestion in existing bands and creating opportunities for innovative new services to flourish.[30] This is particularly true in the current case, as sharing the 5.9 GHz band would create an additional 160 MHz channel, enabling as-yet-unavailable services. NHTSA's assumption that the value generated by unlicensed spectrum stays constant rather than growing over time has a significant impact on the total value. For example, even assuming that one MHz of spectrum is worth $172 million today, as NHTSA has done, if one applies a growth rate of 5 percent to the annual value of unlicensed spectrum and calculate the net present value of one MHz of spectrum for the years 2018-2050 as of 2016, this results in a value of $7.8 billion (versus NHTSA's $3.4 billion) applying a 3 percent discount rate, and $3.9 billion (versus NHTSA's $1.9 billion) applying a 7 percent discount rate.

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[28] NPRM, 82 Fed. Reg. at 3986. In footnote 359, NHTSA cites to a paper by Bazelon and McHenry as support for this assumption. But that paper referred to the present value of licensed spectrum, not the annual value created from it. While the amount someone is willing to pay for licensed spectrum may stay constant from year to year, the profits that one expects to generate from technologies that rely on that spectrum certainly do not. The relatively constant price that a licensee is willing to pay for spectrum reflects consistency in licensees' anticipation of the level of future profits, not stagnation in the cash flows generated by that spectrum itself. The Bazelon and McHenry paper therefore provides no support for NHTSA's premise that spectrum values do not grow over time.

[29] *Id.* Moreover, although NHTSA states that it has calculated the net present value of spectrum as of 2016, the numbers suggest that NHTSA actually calculated the NPV as of 2015.

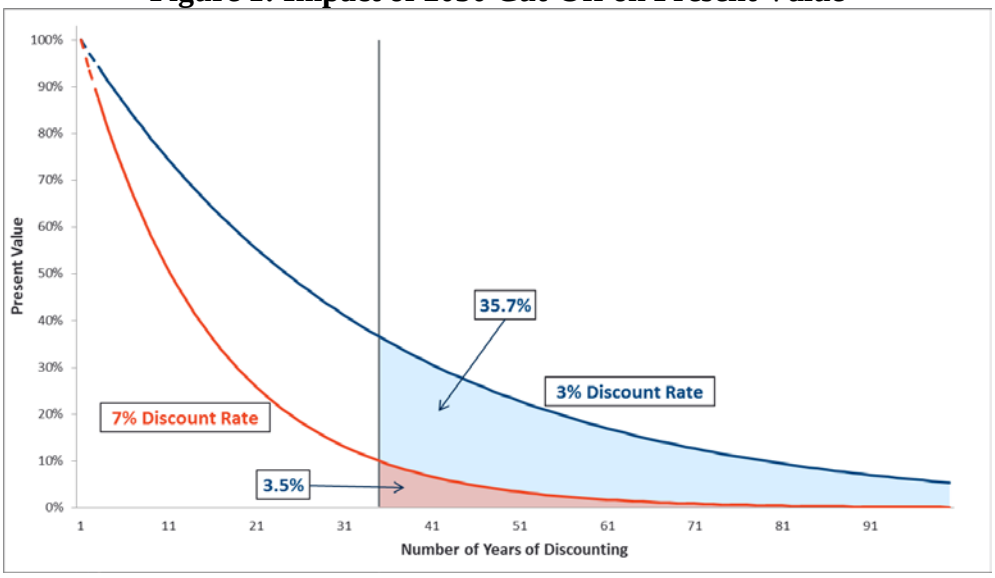
[30] *See* Brattle Report at 30-32 (discussing value creation associated with congestion relief and new use cases).

Table 1: Impact of Assuming Static Benefits of Unlicensed Over Time

Approach	Value/MHz (Billions of $)	Growth Rate Assumed	PV, 3% discount rate (Billions of $/MHz)	PV, 7% discount rate (Billions of $/MHz)	Total Opportunity Cost Range for 10 MHz BSM channel (Billions of $)
NHTSA's estimated value of Wi-Fi	172	0%	3.4	1.9	19-34
Value of Wi-Fi assuming 5% growth	172	5%	7.8	3.9	39-78

NHTSA also arbitrarily truncates its opportunity cost calculation at the year 2050. But if the 5.9 GHz band was available for unlicensed use, it would continue to generate value well beyond 2050. The impact of this arbitrary cut-off is significant, especially at a 3 percent discount rate, as can be seen in Figure 1 below. When discounting at 3 percent, 35.7 percent of the present value would be generated in the years beyond the 35th year (that is, from 2051 onwards).[31]

Figure 1: Impact of 2050 Cut-Off on Present Value



[31] This calculation assumes that unlicensed use would generate value starting from year three, consistent with NHTSA's approach of discounting the value of spectrum for the years 2018-2050 to 2016.

The NPRM goes further astray by calculating an opportunity cost for only the 10 MHz of spectrum that the BSM will use.[32] However, NHTSA's analysis must also account for the measures that the FCC considers necessary to protect this application from harmful interference. As discussed in Part II.A above, the coexistence approach or mitigation measures that the FCC ultimately adopts will have a significant impact on the value of the 5.9 GHz band for unlicensed use. Even if only the channel immediately adjacent to the BSM is significantly impaired by a stringent out of band emissions limit, for instance, this could double the opportunity cost NHTSA estimated.

Adjusting NHTSA's analysis just for two of the many inaccuracies identified above yields an opportunity cost for spectrum *more than seven times the value NHTSA identified*, even assuming that the value of the spectrum does not change over time. For instance, using the latest TAS report's 2017 projected value of unlicensed spectrum yields an unlicensed spectrum value of $395.43 billion.[33] Dividing that number by the total MHz of unlicensed spectrum actually in widespread use today (308 MHz[34]) yields a per MHz value of unlicensed spectrum of $1.28 billion per year. Applying 3 percent and 7 percent discount rates yields a present value as of 2016 of $25.88 billion per MHz at 3 percent and $15.30 billion per MHz at 7 percent.[35] Multiplying by 10 MHz—the spectrum used for V2V BSMs—yields a total opportunity cost of between $153 billion and $259 billion—more than seven times NHTSA's estimated spectrum opportunity cost.

Perhaps more importantly, even retaining many of NHTSA's incorrect assumptions, *the adjusted opportunity cost of spectrum is likely to more than double the total costs of the mandate*. NHTSA estimates that the cumulative cost of the DSRC mandate—excluding spectrum opportunity costs—by 2050 is $92.1 billion,[36] while the adjusted opportunity cost of spectrum through 2050 at a 3 percent discount rate is $259 billion.

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32 NPRM, 82 Fed. Reg. at 3986.

33 TAS estimates a total economic surplus for 2017 of $547.22 billion. We've conservatively subtracted $138.85 billion (the value associated with retail RFID) and a further 12.94 billion (half of the producer surplus associated with Wi-Fi-only tablets), and excluded TAS's estimated annual GDP contribution, consistent with NHTSA's approach. *See* TAS Report at 4, 28.

34 The total of 308 MHz includes 83 MHz in the 2.4 GHz band, 100 MHz in the 5.1 GHz band, and 125 MHz in the 5.8 GHz band. These are the bands with favorable technical rules that facilitate widespread Wi-Fi operations today.

35 The calculation considers the net present value of one MHz of spectrum only as of 2016, with no growth rate in the annual value, for the years 2018-2050.

36 *See* NPRM, 82 Fed. Reg. at 4000.

Table 2: Adjusted NHTSA Spectrum Values[37]

Approach	Value (Billions of $)	MHz	Billions of $/MHz	PV, 3% discount rate (Billions of $/MHz)	PV, 7% discount rate (Billions of $/MHz)	Total Opportunity Cost Range for 10 MHz BSM channel (Billions of $)
NHTSA's estimated value of Wi-Fi	110	638	0.2	3.4	1.9	19-34
Adjusted value of Wi-Fi	395.43	308	1.28	25.88	15.30	153-259

Particularly given the enormous impact of the opportunity cost of spectrum on the total costs of a DSRC mandate, NHTSA erred in declining to include a full analysis of the issue in the NPRM. Fully addressing this critical issue only in the regulatory impact analysis (RIA) that accompanies a final rule deprives parties of a meaningful opportunity to comment on the total costs of the proposed mandate and the specific approach to valuing spectrum.[38] NHTSA should rethink its approach and publicly release its full RIA for comment, including its complete analysis of the opportunity costs associated with precluding shared Wi-Fi use of spectrum, before moving forward with a mandate.

III. NHTSA Fails to Consider Negative Externalities Associated with, or Regulatory Alternatives to, its Proposal to Mandate a Specific Technology

Instead of considering the wide range of technologies that would meet its safety goals, NHTSA improperly has framed the NPRM around one objective: widely deploying DSRC technology. In employing this myopic focus, NHTSA has not paused to consider—much less develop an adequate record on—either the consequences of its proposed technology mandate on the development of other life-saving technologies or any real regulatory alternatives for reducing crashes. These omissions are likely to result in enormous economic and safety costs to the American public. NHTSA's goal should be to improve vehicular safety, not to advance a favored technology.

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37 NHTSA's estimated values appear in Table VII-23 and accompanying text. *Id.* at 3986.

38 *See* Exec. Order 13,563, *Improving Regulation and Regulatory Review*, 76 Fed. Reg. 3821, 3822 (Jan. 21, 2011) (stating that an agency must provide "an opportunity for public comment *on all pertinent parts of the rulemaking docket*" (emphasis added)); Exec. Order 12,866, *Regulatory Planning and Review*, 58 Fed. Reg. 51,735, 51,740 (Oct. 4, 1993) (requiring that agencies "shall . . . provide the public with meaningful participation in the regulatory process") (E.O. 12,866).

A. The Proposed Mandate Would Dampen Innovation and Investment in Other Promising Crash-Avoidance Technologies

As Brattle noted in its analysis filed with NHTSA last year, government technology mandates create externalities that affect "investments in, and developments and implementation of, substitute and complementary vehicle-safety technologies."[39] In the experience of NCTA and its members, the externalities associated with a government-mandated technology are uniformly negative.

Picking winners and losers among competing technologies slows innovation, drives up costs, and stunts quality improvements. The proposed mandate is a *de jure* subsidy of a single technology that will stunt competition and investment in alternative technologies. In particular, selecting DSRC V2V would likely come at the cost of improved vehicle-resident, sensor-based technologies or at the cost of full development and deployment of LTE V2X or 5G. Companies with limited resources forced to put DSRC in every light vehicle would lack the incentive to invest in substitute technologies. This is old-style, command and control industrial policy at its worst.

This problem is particularly acute because available commercial alternative technologies are positioned to begin improving driver safety much sooner than DSRC V2V. For example, vehicle-resident sensors do not require all other cars on the road to be equipped in order to provide crash-avoidance warnings to drivers, while the safety benefits of DRSC would not occur until a significant portion of the U.S. vehicle fleet turns over. Similarly, LTE V2X, which will be commercially available by 2018,[40] would likely penetrate the fleet faster than DSRC, given that many cars already contain LTE radios and nationwide tower infrastructure has already been deployed. In other words, the safety gains that NHTSA predicts from its proposed DSRC mandate are still decades away,[41] while alternative technologies NHTSA does not seriously consider could prevent more crashes sooner. As a result, the proposed mandate would likely result in safety as well as economic externalities.

NHTSA's proposed mandate would also lock in a technology that is already being surpassed by alternatives. Scholars have concluded that DSRC is "likely to be obsolete" before it can be deployed across the fleet.[42] DSRC has been around since 1999, when 2G

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39 Brattle Report at 19-20.

40 5GAA, *The Case for Cellular V2X for Safety and Cooperative Driving* (Nov. 2016), http://5gaa.org/pdfs/5GAA-whitepaper-23-Nov-2016.pdf (5GAA White Paper).

41 NHTSA estimates that the benefits of mandating DSRC in terms of crash avoidance would not exceed the cumulative costs until 2029 at the earliest. NPRM, 82 Fed. Reg. at 3858.

42 Alain Kornhauser, Professor of Operations Research & Financial Engineering at Princeton University & Faculty Advisor, PAVE (Princeton Autonomous Vehicle Engineering), *Summary of the Testimony by the Witnesses*, at 1 (Nov. 19, 2013), http://orfe.princeton.edu/~alaink/SmartDrivingCars/HouseHearing_119113/SummaryO

mobile service still ruled the roost.[43] Opting to mandate DSRC technology in every new car when LTE V2X and 5G[44] are on the horizon is akin to proposing that the government should mandate 2G service in all new iPhones. This is particularly true in light of what the wireless world might look like twenty to forty years into the future when DSRC finally becomes widely deployed in the U.S. vehicle fleet.[45]

B. NHTSA Has Not Adequately Considered Regulatory Alternatives

Rather than consider real regulatory alternatives to a DSRC mandate, NHTSA unlawfully considers only different ways to achieve the same result: mandating DSRC. This approach is inconsistent with Executive Order 12,866 and Office of Management and Budget (OMB) guidance regarding consideration of meaningful regulatory alternatives and would almost certainly saddle the American public with a costly new regulation that does not best serve its interest.

Executive Order 12,866 and OMB Circular A-4 direct Executive Branch agencies to examine regulatory alternatives in order to ensure that agencies adopt the regulatory (or non-regulatory) option that best serves the American people—has the most benefits and the fewest costs—taking into account the universe of available options. Specifically, E.O. 12,866 directs agencies to "assess all costs and benefits of available regulatory alternatives, including the alternative of not regulating."[46] For significant regulatory actions, agencies must assess the "costs and benefits of *potentially effective and reasonably feasible* alternatives to the planned regulation, identified by the agencies or the public (including improving the current regulation and reasonably viable nonregulatory actions)."[47] OMB Circular A-4 similarly states that agencies should "explore modifications of some or all of a regulation's attributes or provisions to identify appropriate alternatives," including considering performance standards rather than design standards and market-oriented approaches rather than direct controls.[48]

Here, the two "regulatory alternatives" addressed in the NPRM are not real alternatives. The NPRM first considers whether, in addition to mandating the installation of a DSRC radio in all new light vehicles, NHTSA should mandate specific DSRC safety

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fTestimony_HouseHearing_111913.pdf.

43 *See* Comments of Ericsson, ET Docket No. 13-49, at 5 (filed July 7, 2016).

44 Dino Flore, 3GPP, *Initial Cellular V2X Standard Completed* (Sept. 26, 2016), http://www.3gpp.org/news-events/3gpp-news/1798-v2x_r14; *See generally* 5GAA White Paper.

45 *See* NPRM, 82 Fed. Reg. at 4007.

46 E.O. 12,866, 58 Fed. Reg. at 51,735.

47 *Id.* at 51,741 (emphasis added).

48 Office of Management and Budget, Circular A-4, at 7-9 (Sept. 17, 2003).

applications.[49] NHTSA also considers adopting an "if-equipped" approach that would set requirements for DSRC V2V, but not set a schedule for requiring new vehicles to contain the technology.[50] Examining only other ways to mandate DSRC—without looking at different transmission technologies or other regulatory alternatives that could meet NHTSA's stated goal of "help[ing] drivers react ahead of time" to "reduce the number and severity of motor vehicle crashes"[51]—misses the point of a regulatory alternatives analysis and fails to comply with the agency's legal responsibilities.

Instead, NHTSA must broaden the universe of available regulatory alternatives considered in the NPRM. NHTSA should have seriously considered whether allowing other vehicle-resident and V2X technologies to develop *without regulation* would be less costly but lead to similar crash-avoidance benefits as mandating DSRC. Yet NHTSA assumed that, despite decades of steady improvements, no further improvements in vehicle safety would occur absent DSRC.[52] NHTSA should also have considered whether mandating a vehicle-resident, sensor-based technology—a potentially effective and reasonably feasible alternative—might strike the best regulatory balance. Any technology that does not require substantial fleet-wide adoption before safety benefits are realized would have obvious benefits. Yet none was considered. At the very least, given the imminent availability of LTE V2X and 5G, NHTSA should have considered whether one of these options—or a performance-oriented standard for wireless communications among vehicles—was superior to DSRC. But NHTSA looked only at alternative methods for mandating DSRC-specific V2V technology, disregarding OMB rules and potentially burdening the American people with a costly regulation that ultimately may not best serve their needs.

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The NPRM demonstrates that the proposed DSRC mandate cannot rest on the analysis NHTSA has conducted so far. Even where a proposed rule may increase safety, the analytical, legal, jurisdictional, methodological, and procedural errors and omissions described above all suggest that fresh thinking is needed before NHTSA moves forward with the proposed mandate. Proceeding on this record would impose enormous costs on the American people without sufficient justification. It would, in short, exemplify arbitrary decision making.

Respectfully Submitted,

Danielle J. Piñeres

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49 NPRM, 82 Fed. Reg. at 3859.

50 *Id.*

51 *Id.* at 3860.

52 *See* Brattle Report at 17-18.